Small Business Innovation Research/Small Business Tech Transfer

High Temperature, High Energy Density and High Efficiency Capacitors for Aerospace Exploration, Phase I

Completed Technology Project (2018 - 2019)

Project Introduction

The project will develop high performance film capacitor with high temperature capability and high energy storage efficiency at high electric filed. In this study, the proposed nanocomposite films have never been attempted to improve their energy storage performance before. If the proposed method is successful, it can be one method to pilot plant scale of advanced nanocomposite films for high temperature, high voltage and high power capacitor with high energy storage efficiency. Powdermet will seek to optimize the approach and fabrication process based on the current results to reach higher energy density pulse-power capacitor at high temperature for future commercial capacitor application.

Anticipated Benefits

This advanced nanocomposite capacitors can be widely used in exploring the deep atmosphere and surface of giant planets, asteroids, and comets through the use of long-lived (days or weeks) balloons and landers, as well as advance aeronautic equipment. The proposed capacitors can work at high temperature and high voltage with high energy density and high energy storage efficiency where tradition power and energy storage device cannot be applied in.

The proposed advanced capacitors can directly benefit pulse power device, such as radar, laser, rail gun, high power microwaves as well as for medical applications such as pacemakers and defibrillators. The high energy density capacitors also have huge potential in other areas, such as energy conversion in photovoltaics and integrated circuits, downhole power electronics in oil and gas industry, transportation applications like hybrid buses and micro-hybrids.

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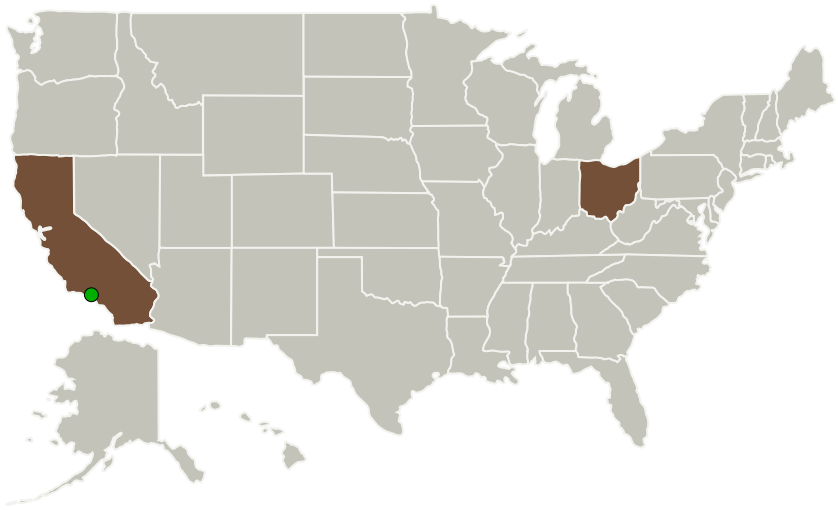
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Powdermet, Inc.	Lead Organization	Industry	Euclid, Ohio
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Ohio

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/141362)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Powdermet, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

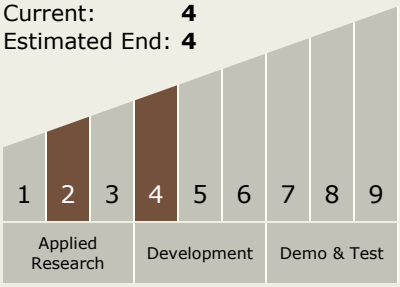
Carlos Torrez

Principal Investigator:

Haixiong Tang

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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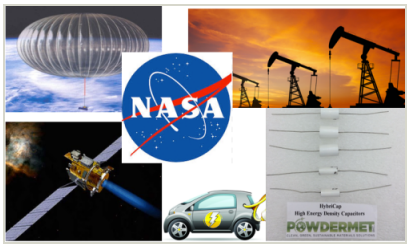
Images



Briefing Chart Image
High Temperature, High Energy Density and High Efficiency Capacitors for Aerospace Exploration, Phase I
(https://techport.nasa.gov/image/132206)

Final Summary Chart Image
High Temperature, High Energy Density and High Efficiency Capacitors for Aerospace Exploration, Phase I
(https://techport.nasa.gov/image/129821)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.3 Advanced Concepts for Energy Storage

Target Destinations

Earth, The Moon, Mars